PROPOSED DCPRS CERTIFICATION CHANGES

DCS MANUFACURERS MEETING
MARCH 22/23 2004

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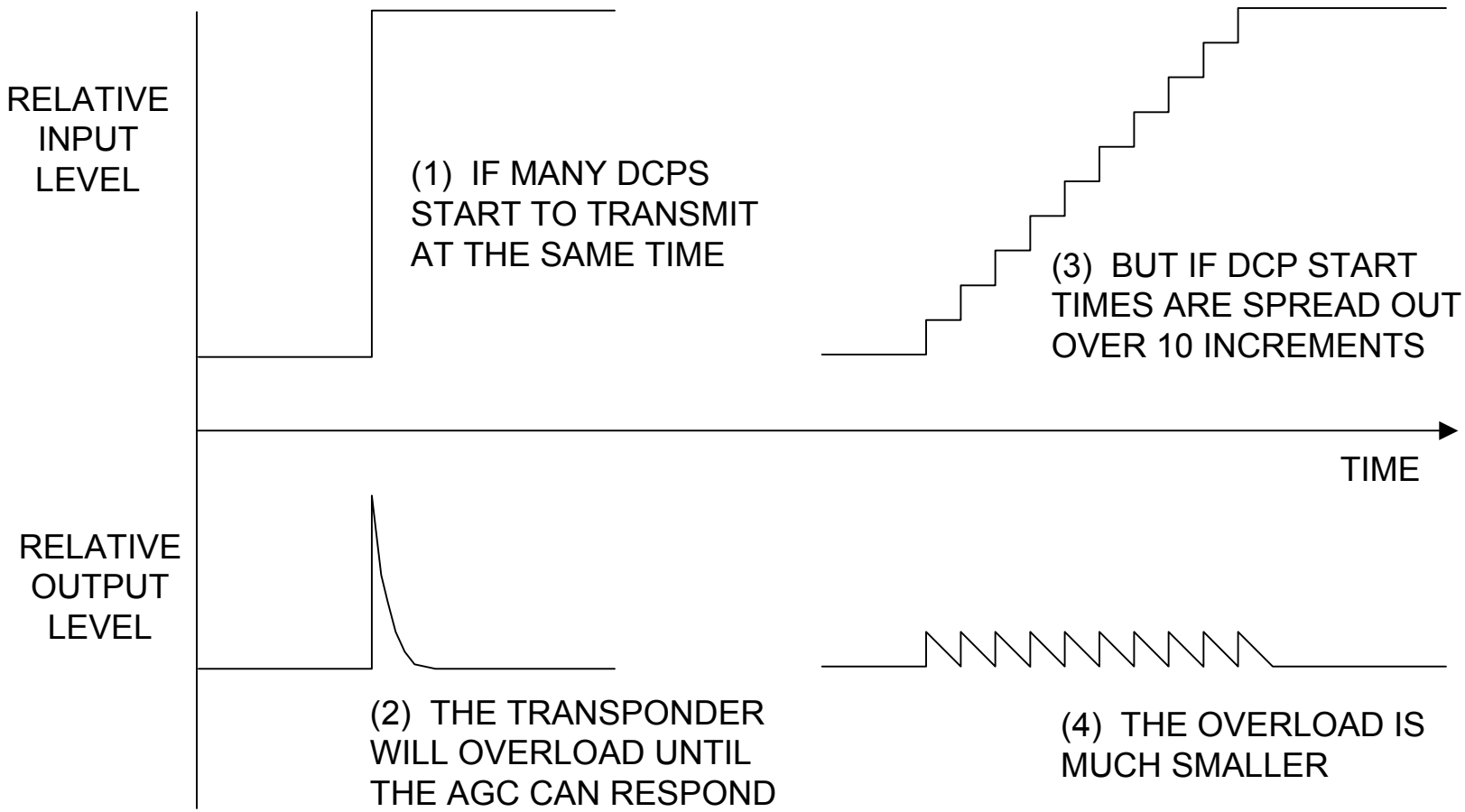
A: TIMING (1)

- Changes required accuracy to ±0.1 sec for both 300 and 1200 bps
  - We believe almost all certified units already meet this requirement by using GPS
- Initial proposed change to subsection 2.1.2 allowed for ±0.2 seconds before inhibition is required
- Now proposed to change this to ±0.1 sec to minimize transponder AGC step size

TIMING (2)

EXPECTED SATELLITE TRANSPONDER PERFORMANCE



TIMING (3)

- GPS reference may not always be available: antenna blockage, attenuation
- Can another reference time system be made available, e.g., through DCPI?
- Can it also be a frequency reference?

The time difference for signal transmission to a receiver at nadir or at 5° elevation is 18.3 mS and this will vary by up to ±0.18 mS over a day due to the satellite inclination of 0.5° max.

B: MESSAGE FORMAT

- Bit 4 in the flag word is changed to an undefined new code
- Also shows implementation of other changes as discussed below
- A new change suggested to formally allow only short preamble at all data rates
  - Insert “The long preamble that was permitted for previous DCPRS transmissions is prohibited.”

C: DATA SCRAMBLING

- This subsection was rewritten to improve clarity – no change to content

D: ENCODER FLUSH

- Number of bits required is increased from 16 to 32 to ensure EOT is clocked through the full decoding process
- Additional requirement for the transmitter turn-off:
  - It was suggested that the words “within 1mS after the end of the last required symbol” be added at the end of the existing sentence
  - Is this a suitable time period?

E: INTERLEAVER

- Proposed to delete this requirement
- Unload times are significant
  - Up to 0.638 Sec or 1.278 Sec at 1200 bps
  - Up to 2.553 Sec or 5.113 Sec at 300 bps
- Theoretical protection times
  - 2 to 27 or 40 mS for 1200 bps
  - 7 to 107 or 160 mS for 300 bps
- Except for error sequences that are within these time frames there is NO benefit

F: PROHIBITED CHARACTERS

- Intent is to allow transmission of any character except EOT
- Specific changes: DLE, NAK, SYN, ETB CAN, GS, RS, SOH, STX, ETX, ENQ, and ACK would be allowed
- Does anyone know of any problems that might be caused by this change?

G: EOT

- Formalize 32nd bit
  - Has always been needed in HDR links as coding requires pairs of bits
- Correct typo in binary EOT

H and I

- H: Maximum Message Length
  - Deleted as it conflicted with 4.6 Fail-Safe
- I: Room Temp Frequency Adjustment
  - Deleted as not needed if proposed change to 4.2.2 Frequency Stability, Long Term is accepted

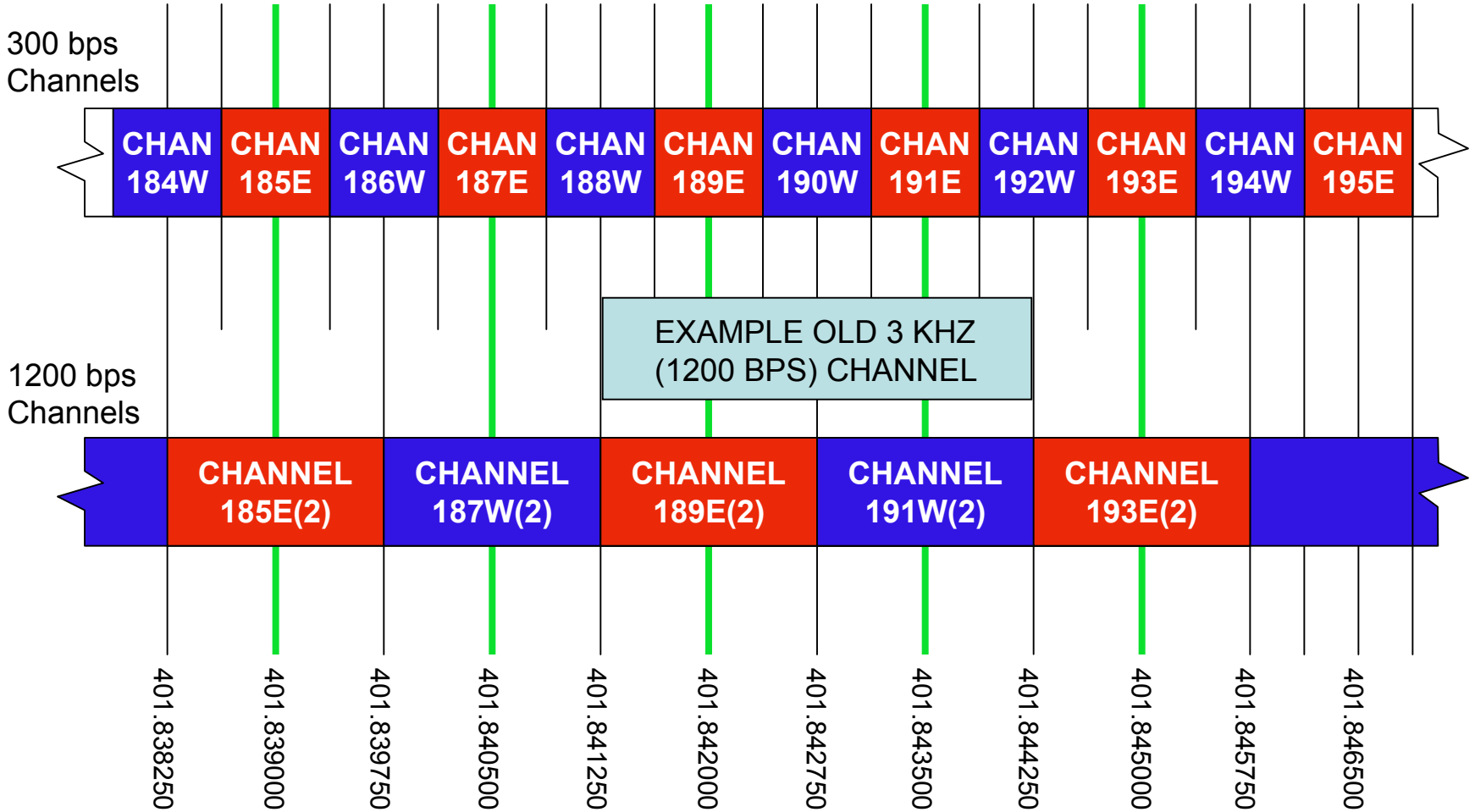
J: RF OUTPUT POWER

- See separate presentation

K: FREQUENCY PLAN (1)

- 1200 bps channel plan will be the same as the current 300 bps channel plan
- 300 bps channel plan splits current 300 bps channels into two equal parts
- Every fourth new channel will be the same as one of the existing 1200 bps channels
- Only needs ½ channel unused between 1200 and 300 bps allocations

FREQUENCY PLAN (2)

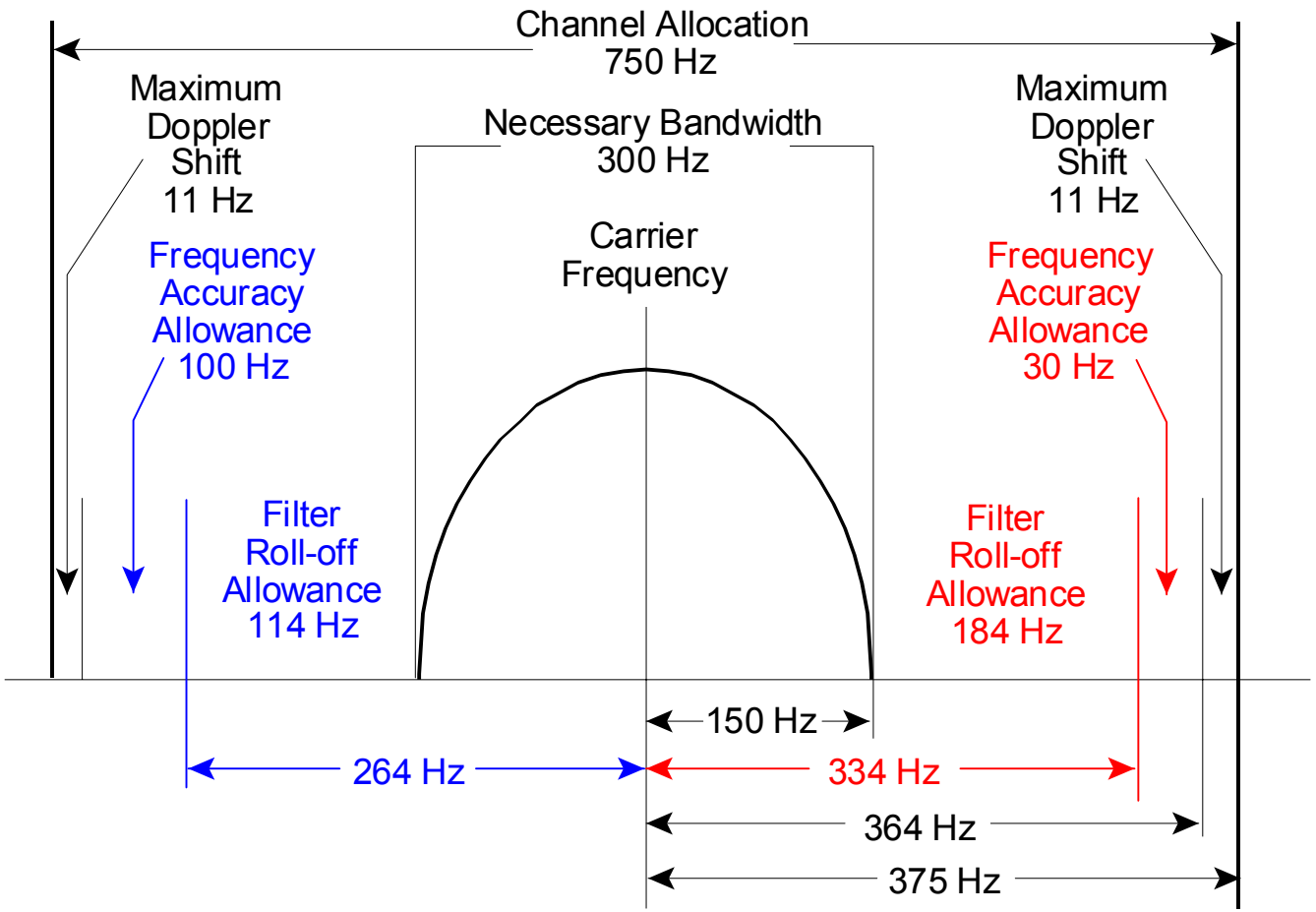


L: FREQUENCY STABILITY (1)

- Proposed change is from ±425 to ±30 Hz
- Not expected to be a problem if GPS used to discipline local oscillator, but GPS antenna can become obstructed
- Is a back-up method needed? (DCPI?)
- Should extra variation be permitted for short periods, e.g., up to 24 hours?

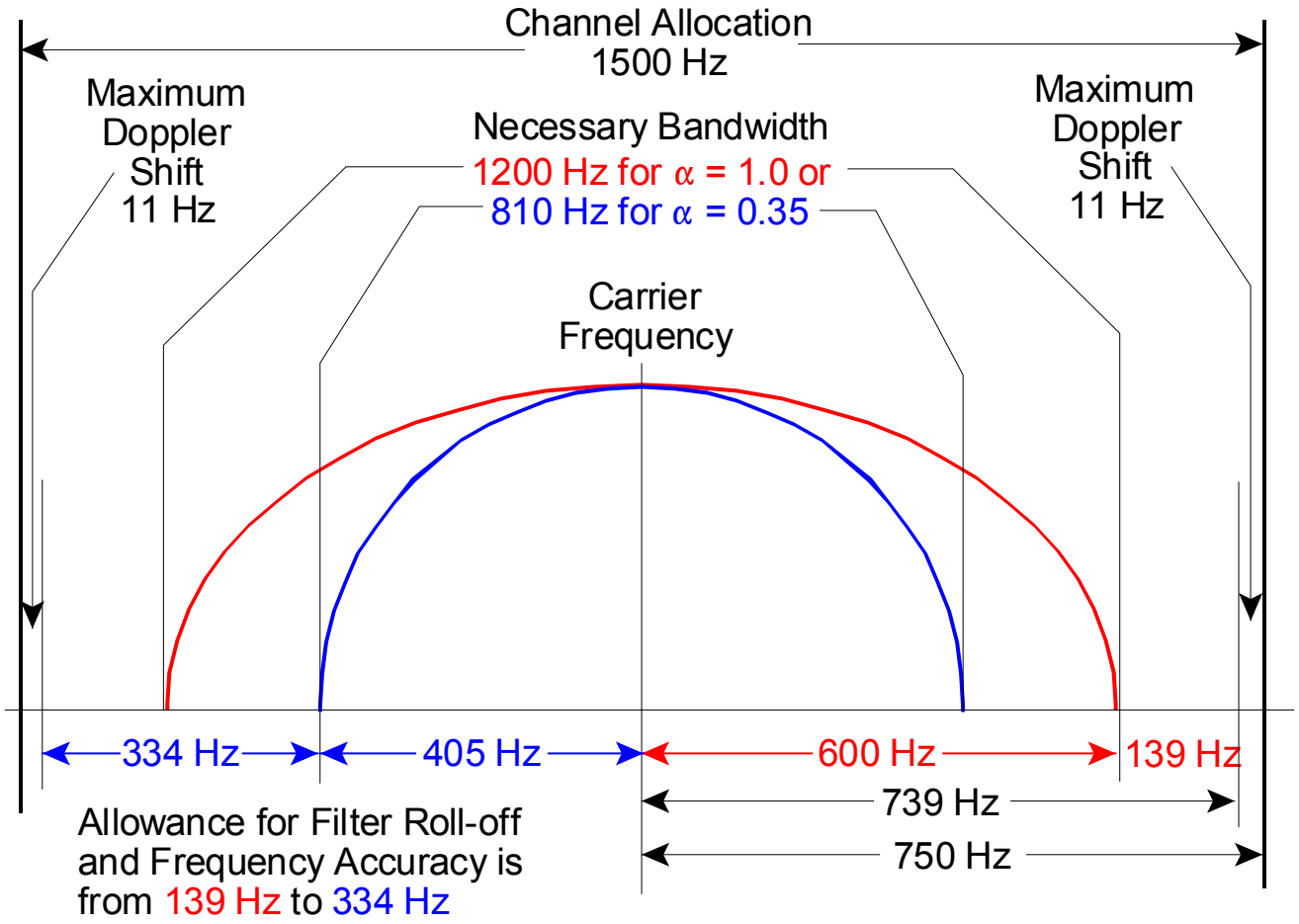
FREQUENCY STABILITY (2)

PROPOSED ALLOCATIONS WITHIN A 300 BPS CHANNEL



FREQUENCY STABILITY (3)

PROPOSED ALLOCATIONS WITHIN A 1200 BPS CHANNEL



FREQUENCY STABILITY (4)

- Potential negative factors for SRRC filters
  - Higher peak to average power ratio
    - Minimal for α equal to 1.0
    - Gets worse as α decreases
  - Inter Symbol Interference for non-optimum sample timing is also worse for smaller α
- The trade-off between frequency stability and α is not obvious but is a parameter that must be set for the system

M: MODULATION STABILITY

- Currently combined with next item

N: PHASE NOISE (1)

- Change to one Phase Noise requirement (including bias or offset in the modulator)
- Requirement reduced to 3.0 degrees RMS
- Oscillator phase noise only relevant from demodulator tracking loop bandwidth to frequency of first sideband null
  - 10 Hz to 150 Hz for 300 bps
  - 36 Hz to 600 Hz for 1200 bps

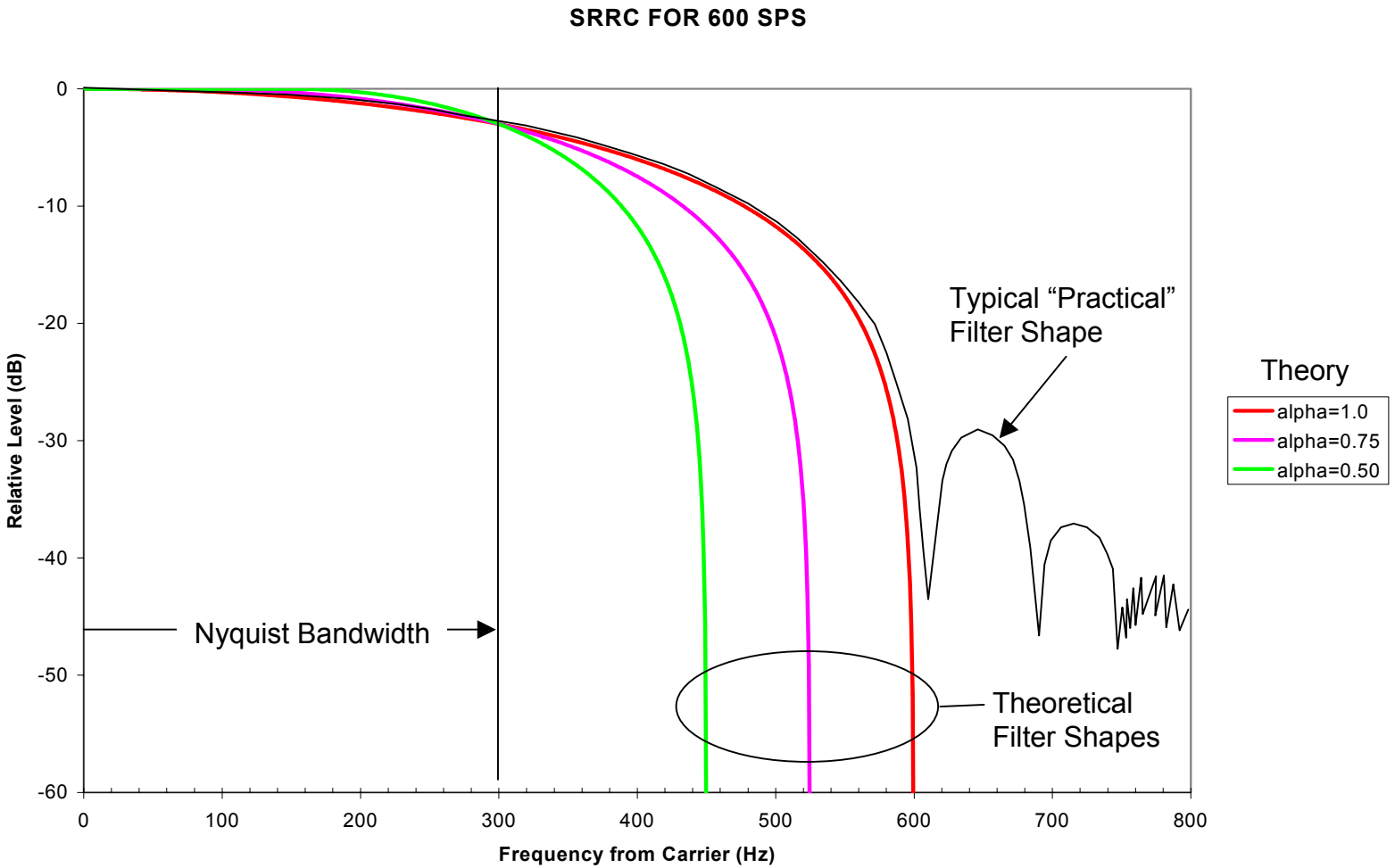
PHASE NOISE (2)

- Changes are intended to
  - Test only for the required parameter
  - Make the test result easy to acquire
  - Make transmitter requirement compatible with overall phase noise budget for the links
  - Tx =2.5, Sat = 1.0, CDA = 2.0 + 1.0
- Proposed subsection refers to Appendix E
  - Appendix E has not been revised
  - Suggestions?

O: NARROW BAND TRANSMIT SPECTRUM (1)

- Proposed to change to -36 dBc for 300bps and -40 dBc for 1200 bps over 100 Hz
- Degrades an adjacent channel by about 0.25 dB for 300 and 0.1 dB for 1200 if both are at equal levels

NARROW BAND TRANSMIT SPECRUM (2)



P: MID-BAND TRANSMIT SPECTRUM

- Review of ITU-R SM.329-10 and SM.1539-1 shows there is a minimum separation from the carrier for low bandwidth signals of 62.5 kHz
- Therefore it is proposed that “250% of the necessary bandwidth” should be changed to “62.5 kHz”

Q: FAIL-SAFE REQUIREMENTS

- Apply 105 second time limit to both 300 and 1200 bps links which limits messages
  - Up to 3,878 bytes for 300 bps
  - Up to 15,630 bytes for 1200 bps
- Allows operation up to limit with NO tolerance
- An additional rule for fail-safe operation has been suggested....

ADDITIONAL FAIL-SAFE RULE

- Add the following text:
  - Activation of the reset feature must be a momentary action, such as the leading edge of a pulse. It shall be impossible to provide more than one pulse each time the reset feature is activated